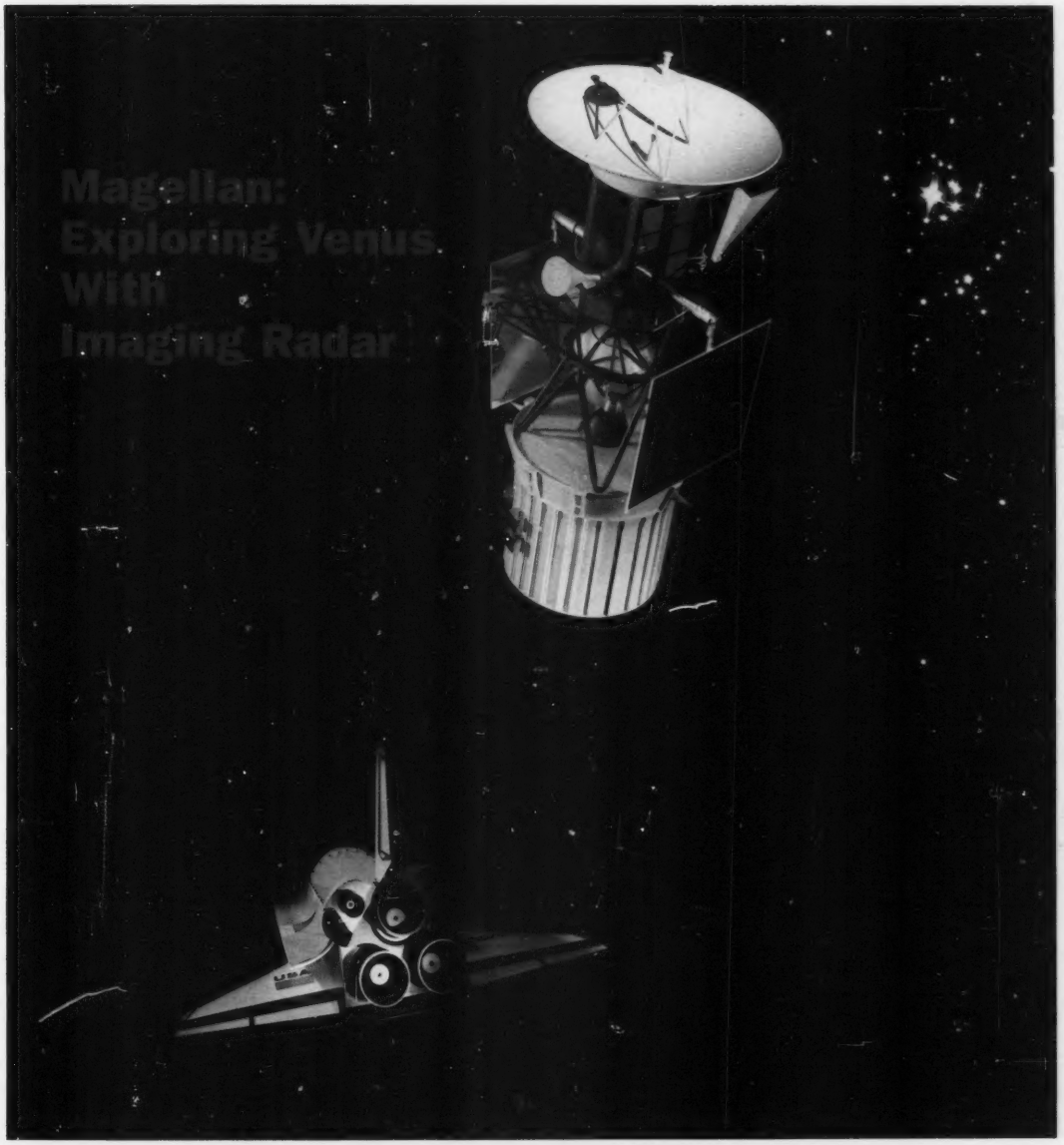
NASA Activities

National
Aeronautics and
Space
Administration

February 1989
Volume 20, No. 2



THIS ISSUE

Just what Space Station Freedom is and what it means to the U.S. civil space effort is explored in our "Official Comment" column this month by Space Station Associate Administrator James B. Odom. The forward thinking program will have far reaching effects.

While NASA scientists and engineers shoulder the efforts to develop Freedom, Headquarters managers work to keep it and other NASA projects on the tracks politically. **This month, "Inside NASA" looks at the Congressional Relations office and how it helps NASA work with Congress. "Congressional Corner" previews the 101st Congress.**

In "Agency Highlights," Earth's twin world, Venus, is the object of our attention as NASA prepares to launch Magellan on an investigative mission that will explore the planet as never before.

Exploration of the solar system by humans is the subject of NASA's Office of Exploration's first in a series of annual reports. Entitled Beyond Earth's Boundaries—Human Exploration of the Solar System, the report details the efforts required to comply with the National Space Policy directive to "expand human presence and activity beyond Earth orbit into the solar system."

New laboratory capabilities at Langley and JPL are called to our attention in "Center Highlights" as is preparation for the flight of the second X-29 forward swept wing aircraft, a flying "lab" facility.

Next Month:

Arctic Ozone: A Preliminary Report from Stavanger.

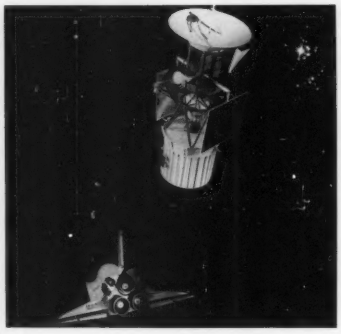
CONTENTS

Space Station Freedom: Key to Our Future in Space 3
Inside NASA: The Office of Congressional Relations 5

Agency Highlights
Magellan: Exploring Venus as Never Before 6
Beyond Earth's Boundaries—Human Exploration of the Solar System 8
NASA FY 1990 Budget Request Summary 9

Center Highlights
Langley Dedicates Unique Laboratory for Materials Testing 10
Astronomers Discover Active Stellar Corpse 10
Ames-Dryden Completes First X-29 Flight Research, Prepares for Second 11
New JPL Microdevices Lab 11

Departments
Q&A: Fishing in Space: The Tethered Satellite 12
Congressional Corner: The 101st Congress Prepares 13
NASA News Capsules 14
Human Factors 15
Another Dividend From Air & Space 16



About the Cover

The Magellan spacecraft, with its Inertial Upper Stage (IUS) rocket, will be launched and deployed by the Space Shuttle Atlantis in late April. The IUS will ignite to propel Magellan toward Venus, a journey that will take 15 months and circle the Sun one and a half times. The Magellan mission is discussed on page 6. Models are used to depict deployment in this photograph.

NASA Activities is published monthly by the National Aeronautics and Space Administration for the information of the Agency's employees. Contributions and recommendations are solicited from Headquarters and field centers, and should be addressed to Editor, NASA Activities, Internal Communications Branch, Code LPC, NASA Headquarters, Washington, DC 20546.

NASA Activities is distributed free of charge only to agency employees. This publication is available by subscription from the Superintendent of Documents, Washington, DC 20402. Checks or money orders should be made payable to Superintendent of Documents, GPO. Subscription rates are $8.00/year, domestic; $10.00/year, foreign.

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Space Station Freedom: Key to Our Future in Space

By James B. Odom, Hq, Associate Administrator, Space Station

"Space Station Freedom will generate not only new knowledge, but also new industries, new products, new jobs and greater innovation and productivity."

In its 30 years in space, this country has pushed forward the frontiers of knowledge to a degree unprecedented in any other period in history. By proceeding with development of a permanently manned space station, we will have put in place the infrastructure to progress even further.

Space Station Freedom is the key to our nation's future in space. It is the key to having a human capability to live and work in space for significant periods.

While recognizing that a space station is not, in itself, a goal, it is certain that without one we will not have a place to develop the technology and systems needed for human exploration of the solar system.

To stop now would be to foreclose on that future and to endure the economic, political and social consequences such a retrenchment would bring. Do Americans want to step up to the challenge? The answer is a resounding yes.

According to a recent research poll, two-thirds of American voters say the space program should be expanded. Americans put space high on the list of national priorities.

The Freedom station has been called "grandiose" and a space palace the nation can neither afford nor efficiently use. This is simply not the case.

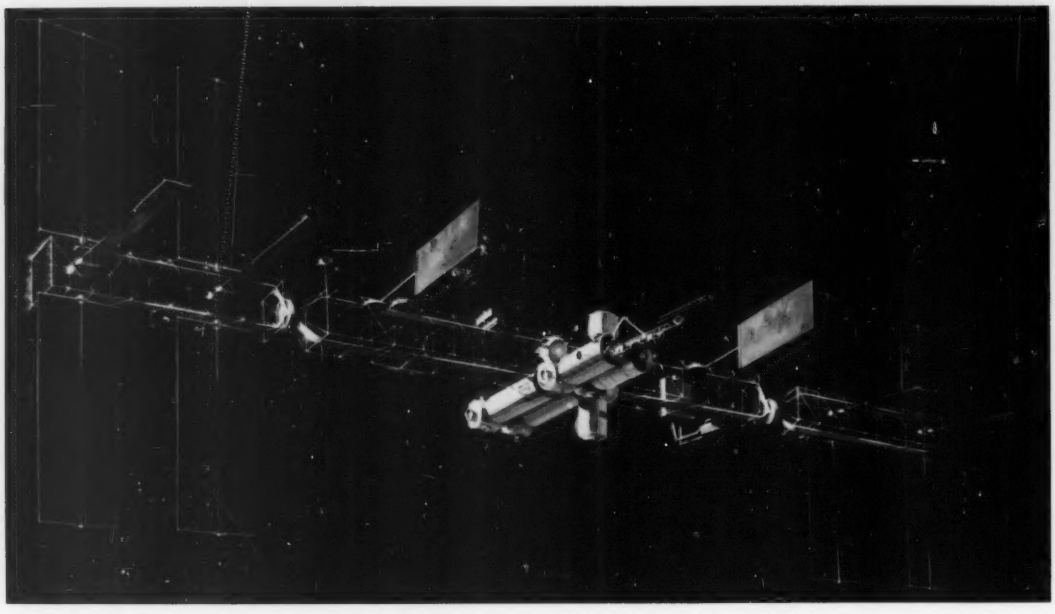
NASA estimates that over the next 10 years, it will require an average of about $2 billion per year—a fraction of the $1 trillion federal budget and an even smaller percentage of the $4 trillion Gross National Product—to develop the station.

Like previous space endeavors that established the United States publicly, dramatically and unquestionably as the leader in space, Space Station Freedom will generate not only new knowledge, but also, new industries, new products, new jobs and greater innovation and productivity that will benefit the American economy and raise the standard of living.

The space station is an investment for the future. The Freedom space station will be an international research and development facility that will, I believe, have a profound impact on our lives here on Earth in ways that we cannot even imagine today.

Development of the station's systems, which will enable people to live and work efficiently in space for months at a time will call for new technologies with spinoffs that will be put into use here on Earth.

I believe long-duration microgravity research conducted in Freedom's three laboratories will make important contributions to



Artist's conception of Space Station Freedom.

fundamental advances in our understanding of basic physical, chemical and biological processes. The results of microgravity research will not only open up new regions of scientific inquiry, but could also reveal new processes

"The Freedom station has been called 'grandiose'...this is simply not the case."

and techniques of value to industries on Earth. And to permit its ultimate use as a transportation mode for expanding human presence out of Earth orbit and into the solar system, Freedom will support biological research that will not only qualify humans for extended stays in space, but also will have down-to-earth clinical applications of benefit to all mankind.

Why does the space station need to be manned? Practically speaking, you need humans who can think, reason and take advantage of the unexpected. Serendipity will play a significant role in discoveries made aboard Freedom just as it does in laboratories here on Earth. But putting aside the practical value of humans in space, our minds and our imaginations have been stretched by space exploration and its boundless potential for human betterment. We can no longer be purely Earthbound again.

Space Station Freedom is a project of international significance, the largest scientific and technological venture the United States has ever undertaken in cooperation with other nations.

Our partners—Canada, Japan and nine European countries through the European Space Agency—are investing nearly $8 billion, or more than 30 percent of the total development cost, in the orbiting complex.

Their contribution of additional laboratories and elements will greatly enhance the basic capabilities we provide. They will also contribute more than 25 percent of the annual operating cost of the facility.

Make no mistake about it; our partners are basing a great deal of their future in space on the success of this project. They believe, as I do, that a permanently manned space station is an essential component of the future exploration of space.

They intend to be active in that future and to that end they have signed a pledge to explore this vast new frontier with us. ■

INSIDE NASA

The Office of Congressional Relations—In a Nutshell

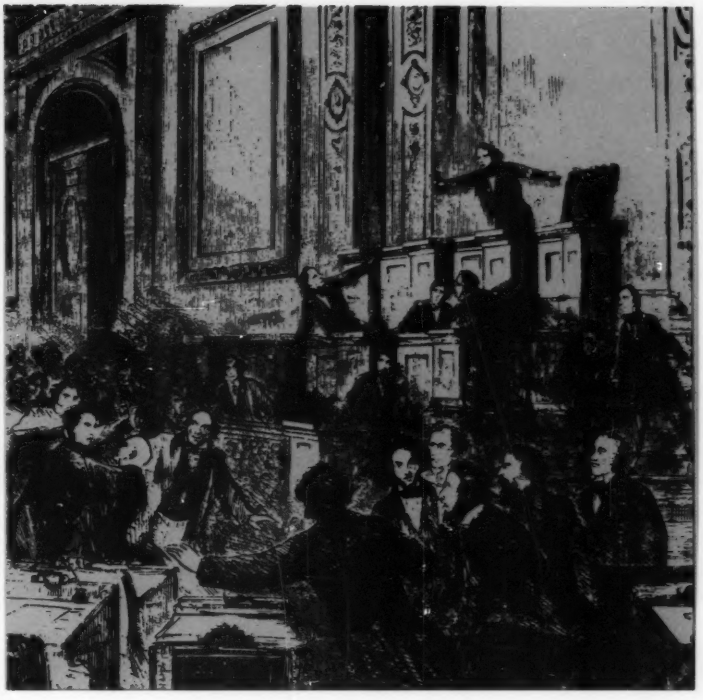
Any entity, be it public or private, which is involved in the making of public policy will contain within its organization an office responsible for the function of Congressional liaison.

At NASA this position is occupied by the Office of Congressional Relations, located under the umbrella of the Office of External Relations. Much as its name implies, the Congressional Relations Office establishes and maintains liaison with the Congress, its leaders, its members, committees and staff.

In its most visible role, the Office arranges for representation of NASA at Congressional hearings, briefs NASA witnesses on the legislative aspects of their appearances, and reviews the statements to insure both compliance with the committee request and an accurate reflection of the Administration's policies and objectives.

NASA's most critical hearings involve the budget legislation; typically, various NASA witnesses from the Administrator to Associate Administrators to Center Directors appear before Congressional committees over forty times in any one budget cycle.

In perhaps less salient but nevertheless important functions, the Office responds to Congressional inquiries on a panorama of issues ranging from contract compliance to astronaut appearances to invention appraisals and even to UFO sitings; provides an interface with the Office of Management and Budget on legislative matters; and arranges Congressional visits to NASA facilities and countless briefings, both at Headquarters and in the field. New avenues are currently being explored in an effort to familiarize all 535 Congressional members with NASA programs and missions.



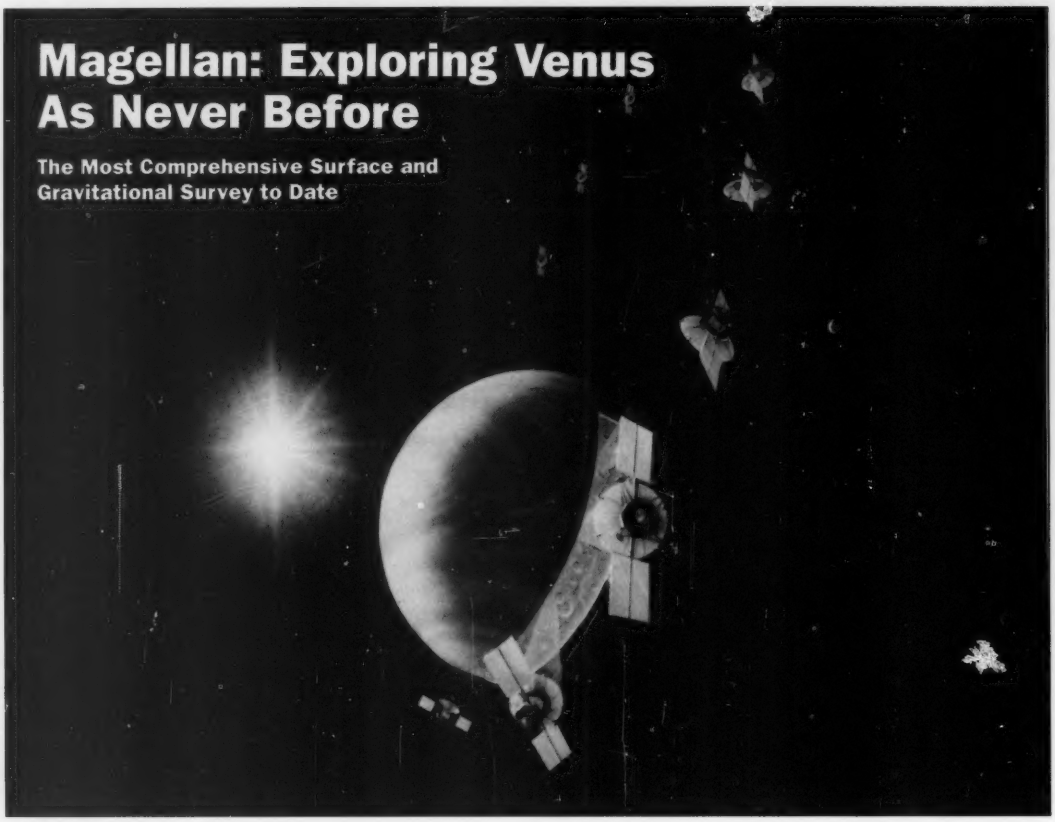
This varied and diverse array of functions of the Office of Congressional Relations has one overriding purpose—to create a good working relationship, a harmony—between NASA and the Hill. This mutual respect, a commodity not bought cheaply but created with years of diligent effort, has given the agency many dividends, the most recent of which is the FY 1989 full funding of the Space Station Freedom: passage in the House 377 to 40 and passage in the Senate 86 to 11.

In addition to responding to Congressional requests, the Office of Congressional Relations also provides information to the agency both in formal reports—the Month in Review, the Legislative Activities Report, Special Issue Reports, etc.—by informal routes through meetings, a note, a phone call.

The Office of Congressional Relations can be reached on 453-1055. ■

Magellan: Exploring Venus As Never Before

The Most Comprehensive Surface and Gravitational Survey to Date



Mapping the surface of Venus, Magellan then reorients itself to beam data back to Earth as shown in this illustration.

Scheduled for launch April 28, 1989, aboard Space Shuttle Atlantis, the spacecraft Magellan will conduct the most comprehensive observation of the surface and gravitational features of Venus ever undertaken. During its 243-day (one Venus rotation) primary mission, the spacecraft will map up to 90 percent of the planet with high-resolution imaging radar.

A primary goal of the Magellan mission is to improve the knowledge of Venus' geologic history. The surface structure, electrical properties, and processes that control them, will be analyzed. Study of the volcanic and tectonic histories will help unravel the complex and interrelated geologic processes that have led to today's surface characteristics.

Magellan also seeks to increase the knowledge of the geophysics of Venus, principally the distribution and dynamics of concentrations of mass within the planet. This objective will be achieved by tracking subtle changes in the spacecraft's orbit as it circumnavigates the globe every three hours and nine minutes.

Magellan's altimetry experiment will result in elevation profiles of the surface. The radiometry experiment will utilize the large antenna to measure the thermal radiation emitted from the surface from which brightness temperatures will be derived. Gravity data, along with results from the Pioneer Venus Orbiter mission, will refine the concept of Venus' gravity field.

Fifteen Soviet and U.S. missions have contributed valuable information about Venus' magnetic field, atmosphere, and topography. Magellan's high-resolution radar will reveal surface features as small as 273 to 377 yards. This performance exceeds that of all previous U.S. and Soviet missions to the sister planet.

During its primary 243-day mission, Magellan will acquire more imaging data than all previous U.S. planetary missions com-

bined. After launch from the shuttle, Magellan will be propelled onto its Venus trajectory by an Inertial Upper Stage, two-stage booster rocket. Once away from the gravitational pull of Earth, the spacecraft will cruise for 15 months (one and one half orbits of the Sun) before reaching its destination. The orbit insertion rocket will then fire and place Magellan into orbit around Venus.

Magellan is a 7,826-pound, three-axis-stabilized craft. Solar panels and three gyroscopic momentum wheels will provide energy and control the motion of the spacecraft.

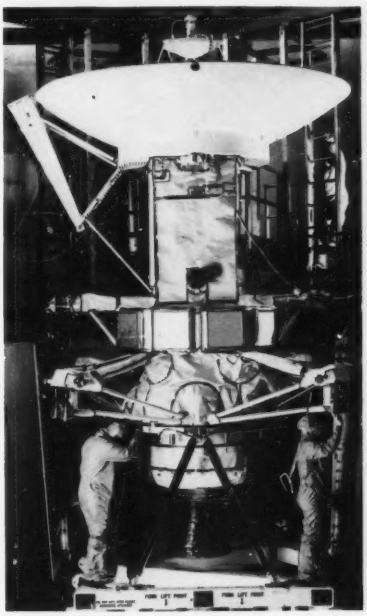
Onboard electrical power will be supplied by the two solar panels, totalling 15.1 square yards. The array will always be pointed toward the Sun, despite the changing Earth-Sun-spacecraft geometry during the mission, and will be capable of producing 1,029 watts during the mapping phase. Two nickle-cadmium batteries will provide power during times of solar occultation and allow normal spacecraft operations independent of solar illumination.

Venus, Earth's closest planetary neighbor, is the swirling cloud-covered sphere known throughout history as both the evening and morning star. Astronomers have called this veiled planet Earth's "twin" because of apparent similarities between the two bodies. The mass and volume (and hence the density and gravity) are remarkably alike.

However, Venus is very different in other respects. The searing surface temperature, 900 degrees Fahrenheit, is sufficient to melt lead. The atmosphere of Venus, composed primarily of carbon dioxide, has virtually no water vapor. The upper clouds, which hide the planet from view, are composed of sulfuric acid droplets.

Exploration by spacecraft has revealed huge continent-sized plateaus, deep canyons, and one of the highest mountains in the solar system. There is also evidence of volcanoes and impact craters. Venus has no moon, and a magnetic field has not been detected. A day on Venus (243.0 Earth days) is longer than its year (224.7 Earth days). Unlike other planets in the solar system, Venus rotates in a retrograde direction (clockwise as viewed from the north pole). To a hearty observer on this hostile surface, the Sun would appear to rise in the west.

Venus' massive atmosphere and thick clouds mask the surface from visual observation. Our most effective instrument for piercing the atmosphere has been radar. Magellan will utilize an innovative radar system which will produce images with higher resolution than those from conventional radar.



Technicians prepare Magellan for testing. Prime contractor for the Spacecraft is Martin Marietta Astronautics, Denver, Colo.

With conventional radar, the resolution of an image depends on antenna size: the bigger the antenna, the better the resolution. A large antenna on a spacecraft, however, would be expensive and difficult to manipulate. To solve this problem, Magellan's synthetic aperture radar (SAR) will create high-resolution radar images by using computer processing on Earth to simulate a large antenna on the spacecraft. The onboard radar system will operate as though it has a huge antenna, hundreds of yards long, when the antenna is actually 12 feet in diameter.

During the 37.2-minute data acquisition phase of each orbit, the SAR will transmit several thousand pulses of radio energy each second. Traveling at the speed of light, the pulses will illuminate a 15.5-mile-wide swath of the planet's surface, then immediately bounce back to be received at the instrument.

The radar system will measure the strength of received signals (brightness), how long each signal took to make the round trip (range to the target point and back), and changes in the signal frequency (pitch) resulting from the spacecraft's motion. Range and pitch-change information will allow computers on Earth to develop high-resolution pictures from the data.

The spacecraft's orientation will be crucial for a successful mission. While mapping, Magellan must point its high-gain antenna toward Venus. While transmitting data, the spacecraft must point that same antenna towards Earth.

Magellan's orientation will be carefully controlled by three momentum wheels, assisted, when necessary, by 12 small gas-thruster motors.

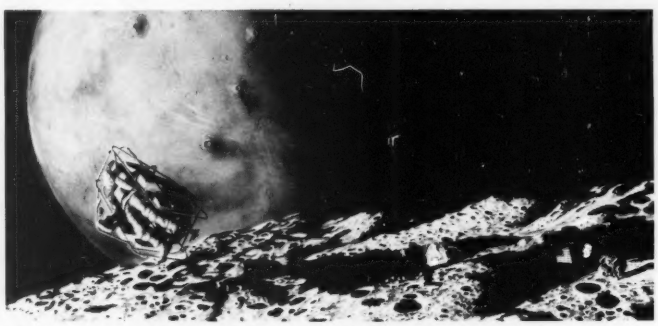
Magellan is managed by NASA's Jet Propulsion Laboratory, Pasadena, Calif. ■

Beyond Earth's Boundaries—Human Exploration of the Solar System

Office of Exploration Releases First In a Series of Reports

NASA's Office of Exploration (OEXP) has released the first in a series of annual reports on the agency's planning efforts and the nation's current capabilities for future human exploration of the solar system.

Entitled "Beyond Earth's Boundaries—Human Exploration of the Solar System in the 21st Century," the report details OEXP's work over the past year to better understand the efforts required to comply with the National Space Policy directive to "expand human presence and activity beyond Earth orbit into the solar system."



Astronauts explore the surface of Phobos as Mars looms overhead, as illustrated in the new Office of Exploration report.

One of the major conclusions in the report is that independent of what type of future exploration course is chosen, the United States must now lay the foundation by beginning a modest but vital effort in detailed research, technology development and concentrated studies in addition to a sustained commitment to the current ongoing NASA programs. By pursuing a modest near term investment of resources in the 1990s in long lead technologies and capabilities, the U.S. will preserve the ability to pursue a wide range of opportunities at the turn of the century.

Among the critical ongoing programs identified in the report are:

- the completion of Space Station Freedom which will serve as the key to developing the long duration capability to live and work in space.
- the continuation of Project Pathfinder which builds the technology base of the U.S. civilian space exploration program.
- the pursuit of a critical life sciences research program which will be the foundation for long duration human habitation of space for both Space Station Freedom and solar system exploration.
- the continued development of more capable Earth-to-orbit transportation systems to increase the capability to transport equipment, propellant and personnel to low-Earth orbit.

The report also identifies additional programs which must be initiated if the U.S. is to maintain its exploration options. These programs are in the areas of artificial gravity research and focused flight test and demonstration programs.

OEXP examined four case studies that encompass a broad range of objectives, requirements and capabilities. All four addressed the prime directive of expanding human presence and activity beyond Earth orbit but, each emphasized a different pathway and destination.

One pathway examined is "Human Expeditions," which emphasizes a significant, visible, successful effort by humans to accomplish the first scientific exploration on another body in the solar system. This type of approach is applied to two different case studies; one involving an exploration mission to Mars and the other an exploration mission to the Martian moon Phobos.

A second pathway is "Science Outpost." This approach also emphasized the advancement of scientific knowledge while gaining operational experience at an extraterrestrial outpost. The case study chosen involves a human tended lunar observatory on the far side of the moon.

The final pathway studied is an "Evolutionary Expansion" approach to open the inner solar system for exploration, resource development and permanent human presence. This approach is applied to a case study using the establishment of an outpost on the moon as a "stepping stone" to similar outposts on Mars and its moons. ■

NASA FY 1990 BUDGET REQUEST SUMMARY

(millions of dollars)

	FY 1989	FY 1990
Research and Development	**4,266.6**	**5,751.6**
Space Station	900.0	2,050.2
Space Transportation Capability Development	681.0	639.0
Space Science and Applications	1,830.2	1,995.3
Physics and Astronomy	(734.1)	(894.5)
Life Sciences	(78.1)	(124.2)
Planetary Exploration	(416.6)	(396.9)
Space Applications	601.4	579.7
Earth Sciences	(413.7)	(434.3)
Materials Processing	(75.6)	(92.7)
Space Communications	(92.2)	(18.6)
Information Systems	(19.9)	(34.1)
Commercial Programs	44.7	61.0
Aeronautical Research and Technology	404.2	462.8
Space Research and Technology	295.9	338.1
Transatmospheric Research & Technology	69.4	127.0
Safety, Reliability & Quality Assurance	22.4	23.3
University Space Science & Technology Academic Program	*	35.0
Tracking and Data Advanced Systems	18.8	19.9
Space Flight, Control & Data Communications	**4,464.2**	**5,139.6**
Shuttle Production & Capability Development	1,128.2	1,305.3
Space Shuttle Operations	2,305.2	2,562.7
Expendable Launch Vehicles	85.5	169.5
Space & Ground Networks, Communications & Data Systems	945.3	1,102.1
Construction of Facilities	**275.1**	**341.8**
Research and Program Management	**1,891.6**	**2,032.2**
Inspector General	*	**8.8**
TOTAL	**$10,897.5**	**$13,274.0**

*** Not a separate budget category in FY 1989.** Funding in FY 1989 for the University Space Science and Technology Academic Program was $22.3 million; $8.6 million for the Inspector General.

CENTER HIGHLIGHTS

Langley Dedicates Unique Laboratory for Materials Testing

by Jean Drummond Clough, LaRC

A new research laboratory is adding to the capabilities of Langley Research Center. Dedication of its Nondestructive Evaluation (NDE) Laboratory occurred in mid-November.

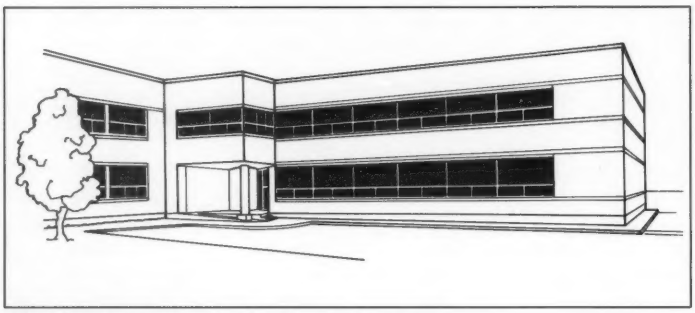
"The new laboratory for testing materials represents a continuing commitment by NASA for vitally needed improvements in the measurement sciences for safety, reliability and maintainability," said Dr. Joseph S. Heyman, head of the Materials Characterization Instrumentation Section.

"Research in this building, with an energetic tradition of technology transfer to industry, will provide an improved understanding and the instrumentation to measure and predict the state of life of materials and structures."

Heyman said that new concepts developed in the NDE laboratory will result in a class of materials that can monitor their own health. "With these facilities," Heyman explained, "NASA will provide a national focus in a critical science and technology having significant impact not only in aerospace, but also in industry and medicine. As such, this laboratory has a direct bearing on the future competitiveness of U.S. products and services at a time when foreign technology trends present a major challenge."

George Rodney, associate administrator for Safety, Reliability, Maintainability and Quality Assurance at NASA Headquarters, Richard H. Petersen, Langley director, William D. Mace, director for Electronics, and Heyman officiated at the dedication ceremony.

Following the ceremony, attendees were invited inside the building to see a demonstration of nondestructive evaluation technology. Microchips were inserted into a socket on a circuit board to complete a circuit, lighting a lamp. At this point, a computer program was triggered to display on several large monitors a sequence of pictures relevant to NDE research at Langley. The program used synthesized speech to commemorate the opening of the new building. ■



The Nondestructive Evaluation Laboratory.

Astronomers Discover Active Stellar Corpse

A group of astronomers has discovered evidence of vigorous activity in a white-dwarf star previously thought to be a stellar "corpse" incapable of such lively behavior. This new and unexpected behavior may offer astronomers new insight into how stars are born, evolve and ultimately die.

When stars like the Sun exhaust their nuclear fuel, they end their lives as inert white dwarfs, compact objects about the size of the Earth. Astronomers have long believed that white dwarfs are incapable of further evolution other than a gradual cooling off.

The white-dwarf star, cataloged as 0950+139, lies at the center of a faint nebula called EGB 6 and is located about 1,500 light-years from Earth in the direction of the constellation Leo. The nebula was formed an estimated 50,000 years ago when the star was in the red-giant stage, which occurs late in a star's evolution. When red giants subsequently exhaust their nuclear fuel and "burn out," they contract to become white dwarfs.

Astronomers commonly believe that white-dwarf stars mark the end of any further stellar activity other than a gradual cooling off over billions of years. The researchers found, however, that 0950+139 is surrounded by a glowing cloud of gas about the size of our own solar system. The star apparently has very recently shed additional gas long after entering the white-dwarf stage.

Howard E. Bond of the Space Telescope Science Institute, Baltimore, Md., James Liebert and T. Fleming of the University of Arizona, Richard Green of Kitt Peak National Observatory, J.B. Holberg and K. Kidder of the Lunar

continued on page 16

Ames-Dryden Completes First X-29 Flight Research, Prepares for Second

Researchers and pilots at NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., have completed flight tests on the first experimental forward-swept-wing X-29 aircraft and are planning high angle of attack flight tests, now scheduled for spring 1989, for the second X-29.

Investigations of the X-29's flight controls, flying qualities and its extensive use of composite materials have shown that the forward-swept-wing concept is practical and have added to the data base for the design of future aircraft.

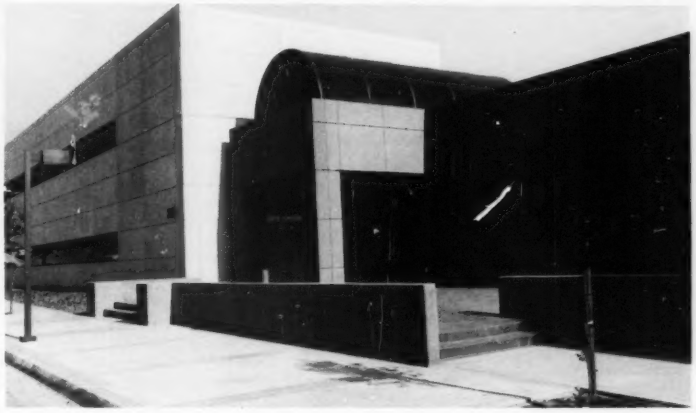
"We have proven that the design is viable," says NASA X-29 Program Manager Gary Trippensee. "Our next step is to look at low-speed, high angle-of-attack characteristics of a forward-swept-wing aircraft using the second X-29."

During pitching maneuvers, angle of attack is the angle of the nose of an aircraft relative to its flight path. The ability to fly and maneuver at high angles of attack can provide great advantages to pilots of high-performance aircraft in situations requiring super maneuverability.

While aircraft-1 has been limited to 20 degrees angle of attack, aircraft-2 has been modified to permit safely flying at higher angles of attack. Researchers plan to increase angles by increments to a maximum of about 80 degrees.

During its two-phase, four-year flight program, X-29 aircraft-1 flew a record total of 242 flights.

NASA project pilot is Stephen D. Ishmael, with Rogers Smith flying as co-project pilot. Air Force project pilot is Major Alan Hoover. ■



New JPL Microdevices Lab

By R.C. House, JPL

Above: JPL's Microdevices Laboratory (MDL), home of NASA's Center for Space Microelectronics Technology, was dedicated in October.

Presided over by officials from NASA, the Department of Defense, the Jet Propulsion Laboratory, and California Institute of Technology, JPL's Microdevices Laboratory—headquarters for NASA's Center for Space Microelectronics Technology (CSMT)—has been dedicated.

Established by a January 1987, Memorandum of Understanding between NASA and Caltech, CSMT provides long-range research and development in advanced microelectronics for NASA and Department of Defense space missions.

CSMT will be a focal point for scientific collaboration and the melding of technological talent from a wide variety of agencies and institutions.

Underscoring that aspect of the Center, Dr. Lennard Fisk, NASA associate administrator, Office of Space Science and Applications, one of several speakers at the dedication, observed that "it's a unique match—being able to bring together the JPL capabilities, the Caltech capabilities, and the capabilities of the people that are going to come and visit and work here..."

Sharing the speakers' rostrum with Dr. Fisk were Dr. Lew Allen, JPL Director; Dr. Thomas Everhart, Caltech President; Dr. Dwight Duston, Director of the Innovative Science and Technology Office of the Strategic Defense Initiative Organization, and Carl Kukkonen, Center Director.

Master of ceremonies was Dr. Terry Cole, JPL Chief Technologist.

The Microdevices Laboratory (MDL) is the principal facility of the center. Using the new 38,000-square-foot, three story laboratory, the CSMT will develop and test improved sensors and high-data-rate information processing and storage devices.

The MDL offers a full complement of state-of-the-art equipment for device fabrication, including clean rooms, diagnostic laborato-

continued on page 12

Q&A

The following questions and answers are excerpted from interviews conducted for NASA's radio program "The Space Story".

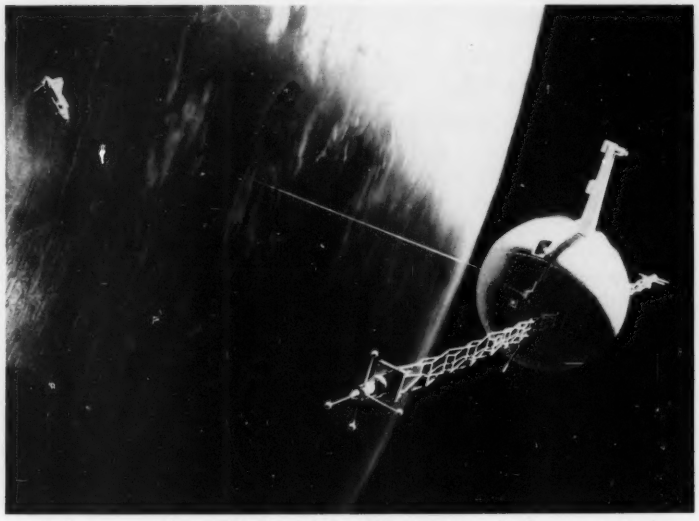
Fishing in Space: The Tethered Satellite

In just a few years, Astronauts will begin fishing from space. Sound strange? Well, that's what it will seem like when space shuttle crews in the early 1990's begin using a satellite on the end of a long tether, deploying it for miles into space or skimming it through the upper Atmosphere of the Earth.

Q What is the Tethered Satellite System?

A According to Marshall Space Flight Center project scientist Dr. Nobie Stone, the tethered satellite system is a unique piece of hardware that can be reeled out and then rolled back into the Shuttle's cargo bay. The satellite will not only "fish" for new scientific data but use the concept to generate electrical power. This satellite-on-a-string project is being developed as a bi-national effort between the United States and the Italian government.

Says Dr. Stone, "Basically, the idea is that a satellite which is on the order of 80 inches in diameter and weighs 1,200 to 1,500 pounds can be deployed on a long string. The dynamics of the situations are such that it is stable, either being deployed directly away from the Earth, or directly toward the Earth to a distance of up to about 60 miles."



Artist's conception of Tethered Satellite System deployment during initial mission.

Q Designed to be used multiple times with different experiments, what will the first tethered satellite test study consist of?

A One of the first experiments utilizing the tether will be to stretch it out some 12.5 miles. This test will study how a tether slicing through space could serve as a generator of electricity.

"...the string or the tether is not just a string. It consists of a copper wire at its core, the copper is insulated and then around the insulated copper wire is a kevlar braid.

"...a 12.5 mile long wire, stretched out above the orbiter to the satellite will be moving at a speed of almost five miles per second around the Earth and therefore it will cut through the Earth's magnetic field, the geomagnetic field. In doing this, it will act very much like a generator and we expect that on the order of 5,000 volts of electric potential will be developed across this wire." ■

Laboratory

from page 11

ries, conference rooms and offices for approximately 50 scientists and engineers. The clean rooms, occupying about half of the floor plan, provide a dust-free environment for lithography and semiconductor device fabrication.

Major research areas encompassed by CSMT are solid state devices, photonics, custom microcircuits, and computer architecture.

Devices created and developed through proof-of-concept stage in the MDL will be turned over to private industry for production.

The CSMT is guided by a board of governors chaired by Dr. Allen and made up of Drs. Everhart, Fish and Duston, Professor Barclay Kamb, Caltech provost; and Drs. William F. Ballhaus, Jr., NASA Associate Administrator, Office of Aeronautics and Space Technology; and Raymond Colladay, Director, Defense Advanced Research Projects Agency. ■

CONGRESSIONAL CORNER

Congressional Corner is written and edited by the Congressional Relations Office.

The 101st Congress Prepares

Shortly after the November 8 election, which returned a Democratic majority to both the House and Senate, Capitol Hill was abuzz once again in organizational meetings in preparation for the 101st Congress convened on January 3, 1989.

Senate

In late November the Senate Democrats met in closed party caucus session and elected a new Majority Leader, George Mitchell of Maine. Mitchell, who takes over from Majority Leader Byrd (D-WV), stepping down to assume the chairmanship of the Senate Appropriations Committee, handily defeated two opponents: Senators Inouye (D-HI) and Johnston (D-LA).

Also in late November, the Senate Republicans met in closed session to elect their leaders—but no challengers presented themselves and therefore no surprises were in the offing.

The Senate Leadership roster for the 101st Congress follows:

Majority

Majority Leader—George J. Mitchell (D-ME), Majority Whip—Alan Cranston (D-CA), Chief Deputy Whip—Alan J. Dixon (D-IL), Secretary of the Democratic Conference—David Pryor (D-AR).

Minority

Minority Leader—Robert Dole (R-KS), Minority Whip—Alan Simpson (R-WY), Chairman of the Republican Conference—John Chafee (R-RI).

Senate Democrats also elected chairmen of the various standing committees; in turn the committees began their internal subcommittee organization. NASA faces a sweeping change in its committee leadership with new chairmen for both the authorization and appropriations subcommittees: Albert Gore (D-TN) takes over the helm at the Senate Subcommittee on Science, Technology and Space and Senator Barbara Mikulski (D-MD) will chair the Senate Subcommittee on HUD-Independent Agencies. Rosters for the panels are not complete as of this writing.

House

House Members of both parties, organized separately, on December 5, 6, and 7, 1988.

In the only contested race for a Democratic leadership position, William Gray (D-PA) bested both Mary Rose Oakar (D-OH) and Mike Synar (D-OK) to become the Chairman of the House Caucus, an increasingly important body. The slot had been vacated by Richard Gephardt when he entered the Presidential race.

On the Minority side, the Republicans allowed its leaders to simply move up the ladder when the Minority Whip rung, occupied by Trent Lott, was vacated due to his successful bid for the Senate.

The House Leadership roster for the 101st follows:

Majority

Speaker—Jim Wright (D-TX), Majority Leader—Tom Foley (D-WA), Majority Whip—Tony Coehlo (D-CA), Chief Deputy Majority Whip—David Bonior (D-MI), Chairman of the Democratic Caucus—William Gray (D-PA).

Minority

Minority Leader—Bob Michel (R-IL), Minority Whip—Dick Cheney (R-WY), Chairman of the Republican Conference—Jerry Lewis (R-CA).

The House committee organization, results in one major change for NASA—the long-time Chairman of the HUD-Independent Agencies Appropriations Subcommittee, Mr. Boland, retired and was replaced by Robert Traxler (D-MI). As in the Senate, committee and subcommittee organization and assignments are not complete.

Look for a complete committee and subcommittee member listing in the next edition. ■

NASA NEWS CAPSULES

News Capsules are NASA news releases edited by the Internal Communications Branch, Office of Communications.

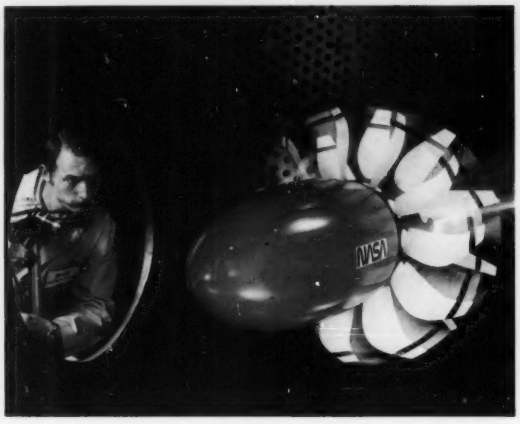
NASA Commercial Programs Office Publishes Users Catalog

NASA's Office of Commercial Programs has published a national inventory of information to assist commercial space researchers.

Titled "Accessing Space: A Catalog of Process, Equipment and Resources for Commercial Users," the new publication is intended for companies and research organizations considering or having in process, a research project involving commercial applications of the unique characteristics of space.

The catalog provides an orientation to commercial applied research in space and an inventory of equipment apparatus, carriers, launch vehicles, resources and services available from NASA and U.S. industry.

The Office of Commercial Programs provides the focus within NASA for actions to expand U.S. private sector investment and involvement in the civil space program and the implementation of national space policies intended to encourage the commercial uses of space.



This two-foot model of the General Electric's Unducted Fan (UDF) recently completed aerodynamic, acoustic and aeroelastic testing in Lewis Research Center's 8 x 6-foot supersonic wind tunnel at cruise conditions (up to Mach .85). The laser, shown being aligned, is part of a system to measure blade deflections under actual operating conditions. This test is part of Lewis' program to study the interaction between the stages of counter-rotating systems, to develop structural methods for designing blades with greater sweep and to obtain data on higher cruise speed designs and smaller diameter propellers with light loadings.

JSC Calls for Proposals for Reusable Reentry Satellite

Officials at the Johnson Space Center (JSC), Houston, have released a request for proposal (RFP) for continued studies and design of an unmanned reusable reentry satellite (RRS) that could significantly expand NASA's capability to investigate the weightlessness environment.

The RRS, called LifeSat when carrying life science payloads, will be placed into Earth orbit by an expendable launch vehicle, reserving the National Space Transportation System for activities requiring crew presence.

The RFP calls for the design of an almost completely reusable spacecraft that could be processed and readied for reflight in two months, allowing for several flights each year. Designs are expected to be derivatives of the often-flown Department of Defense Discovery satellite or the NASA Gemini/Apollo vehicles of the 1960s, calling for a vehicle roughly six-feet in diameter and weighing more than 2,000 pounds with a useful payload of 500 pounds.

RRS will be used primarily in the fields of life sciences and materials processing and would fly experiments in a variety of orbits including those providing high doses of radiation for periods up to and perhaps, beyond 60 days. Upon completion of the flight, the RRS would reenter and soft-land at a designated ground-site where scientists and engineers would have immediate access to the experiments.

Contracts for the design studies to begin this summer will be awarded to two vendors at a cost of $1 million each. The project will be managed by JSC and could be flown as early as 1993 if future development efforts are approved.

Five international agencies have expressed interest in participating in the RRS and are expected to conduct parallel study efforts to the U.S. activities. ■

HUMAN FACTORS

Robins Named AA Management as Peralta Leaves NASA for ANSI

Robins

Peralta

NASA Administrator Dr. James. C. Fletcher has named C. Howard Robins, Jr., associate administrator for management, NASA Headquarters, following the departure of Manuel (Manny) Peralta.

Peralta, the former associate administrator for management, NASA Headquarters, has left NASA to become president of the American National Standards Institute (ANSI), Washington, D.C.

Peralta's primary responsibility at NASA was to help strengthen the agency's core organizational and infrastructure capabilities following the Challenger accident. He served in his last position from April 1987, first as acting associate administrator and then in a permanent capacity.

Robins was appointed deputy associate administrator in 1984. He has served in various capacities at NASA for more than 30 years, having joined the agency as a student aeronautical engineering trainee. He worked at Langley Research Center and Johnson Space Center before transferring in 1976 to Headquarters.

He was selected for the President's Executive Exchange Program in 1983 and completed an industrial assignment at Newport News Shipbuilding and Drydock Company before returning to NASA Headquarters to assume his current position.

Baucom Receives Presidential Honors

Robert M. Baucom, group leader, Polymeric Materials Branch, Langley Research Center, has been presented the John F. Fogarty Public Personnel Award sponsored by the President's Committee on Employment of the Handicapped.

Baucom was honored at the International Association for Personnel in Employment Security Convention held recently in Chicago.

He has designed a number of lightweight ambulation and protective devices for the handicapped and directed a project to design and build a lightweight, general use wheelchair.

Tanner Directs Space Station Freedom Program Office

E. Ray Tanner has been named director of the Space Station Freedom Program Office.

Tanner succeeds Thomas L. Moser who was appointed deputy associate administrator for space station.

Tanner directs the Space Station Freedom Program Office, Reston, Va., which is responsible for the overall technical direction and content of the space station, including systems engineering and analysis, configuration management, budgeting and schedules.

The international space station complex, being developed by the United States, nine European countries, Japan and Canada, will permit establishment of a permanent human presence in Earth orbit and includes unmanned scientific platforms placed into polar orbits.

Tanner served as manager of the Space Station Projects Office, Marshall Space Flight Center, Huntsville, Ala., a post he held since August 1988. Prior to that, he was deputy director for space systems in the Science and Engineering Directorate.

Tanner joined the Marshall center in 1960.

President Appoints Sokoloski

Dr. Martin M. Sokoloski has been appointed as a member of the National Commission on Superconductivity. The appointment was made in January by President Reagan.

Sokoloski is Manager for Sensor and Communications Technology at NASA Headquarters, a position he has held since 1979.

The newly formed commission is charged with reviewing all major policy issues regarding U.S. applications of recent research advances in superconductors. The commission will assist Congress in devising a national strategy to assure U.S. leadership in the development and application of superconducting technologies and recommending research and development priorities.

Sokoloski has served on numerous national advisory committees, including the Subcommittee on Superconductivity of the President's Office of Science and Technology Policy's Federal Coordination Committee on Science, Engineering and Technology. ■

ANOTHER DIVIDEND FROM AIR & SPACE

Planetary Image Processing Offers Hope to "Spot Blindness" Patients

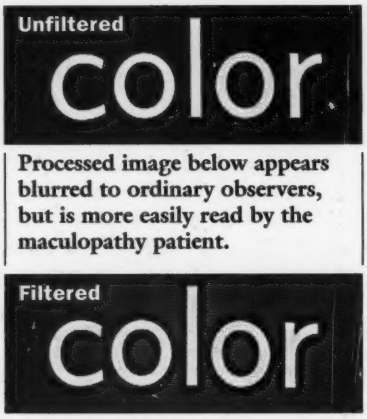
Research and development in aeronautics and space have provided numerous benefits for all Americans at a tiny percentage of the tax dollar. Here is an example:

A new digital, visual-filtering technology, developed by a researcher at NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif., will offer new hope to sufferers from maculopathy or central spot blindness. Such people, mostly elderly, can no longer see fine detail or read, because of degeneration of key retinal cells in the eye.

The technology is based on digital image processing, originally developed at JPL to enhance the first pictures of Mars obtained by the Mariner 4 spacecraft in 1965. This technology is widely used today to enhance satellite data, photographs and other images in applications from space to medicine. It was adapted as a non-invasive method of relieving vision problems by Dr. Teri B. Lawton, a psychologist and mathematician researching fundamental visual functions in JPL's Robotics, Teleoperators, and Human Factors Research Group.

Dr. Lawton uses a small computer, interactively, to test an individual's vision loss and then, with customized image-processing software, to alter the spatial contrast and other properties of printed material so that the tested observer can read it more easily.

Maculopathy is essentially a degeneration of nerve cells rather than a problem of the lens or other parts of the eye, and does not respond to conventional treatment or corrective lenses.



Processed image below appears blurred to ordinary observers, but is more easily read by the maculopathy patient.

Powerful magnifiers, which may spread a few fuzzy letters over the whole field of vision, have given some relief. The image-processing approach, now in early stages of development, uses closed-circuit TV equipment linked to a computer to present enhanced and moderately enlarged words and sentences onscreen to the reader. The computer-modified images appear blurred to an ordinary observer, but are more easily readable by the person for whom the enhancement formula was made.

Reading performance improvements resulting from this computer-enhancement method are shown in increased reading speed and reduced magnification required to see the words. In recent experiments, Dr. Lawton found that reading rates were improved 2-3 times, with 32-70 percent less magnification required for reading, compared to reading unenhanced words.

A long development lies between the minicomputer-based prototype and a practical, portable reading machine, according to Dr. Lawton. "The next step is a desktop system, something like a microfilm or microfiche reader," says Dr. Lawton. "I would like to get some of these out to low-vision clinics for wider use and clinical evaluation." Books and magazines would be inserted and moved past the TV camera's lens for reading.

To carry out this next step, JPL has formed a collaboration with Visualtek, Inc. (VTEK), of Santa Monica, Calif. VTEK will play an active part in optimizing the JPL technology for an effective, inexpensive commercial product, planned to enter the market by the end of 1991. ■

Stellar Corpse

from page 10

and Planetary Laboratory, and F. Wesemael of the University of Montreal, presented their findings at the 173rd meeting of the American Astronomical Society, in Boston, Mass. The research was supported by the National Aeronautics and Space Administration and by the National Science Foundation.

These findings are based on spectroscopic observations of the star made at Palomar, Kitt Peak, and Steward Observatories, and by NASA's International Ultraviolet Explorer satellite. "A spectrum like this, with unmistakable signs of a surrounding gas cloud has never been seen before in such a highly evolved star," says Bond. "My coworkers and I believe the gas indicates that the star has very recently undergone additional mass loss." ■